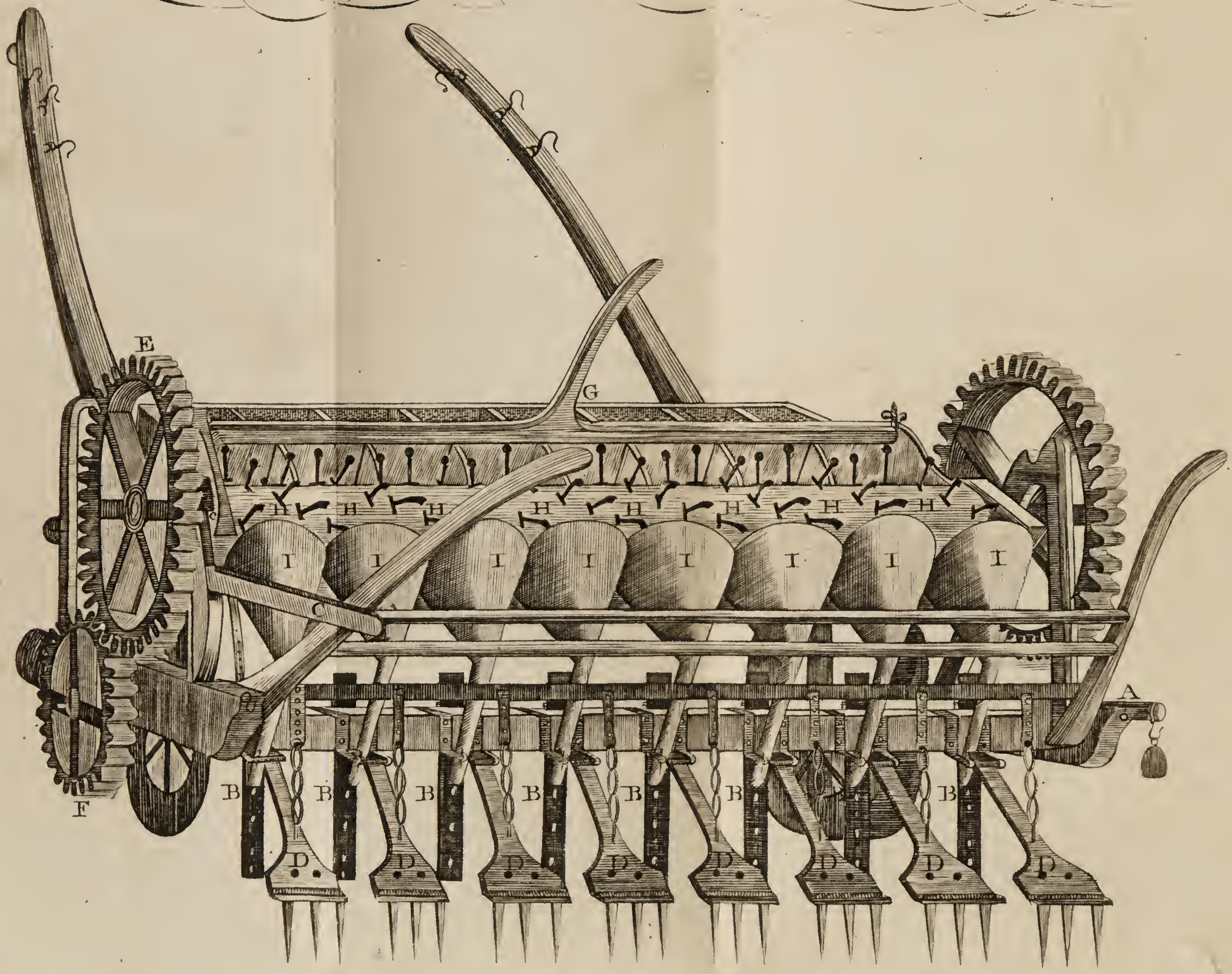
18665/P

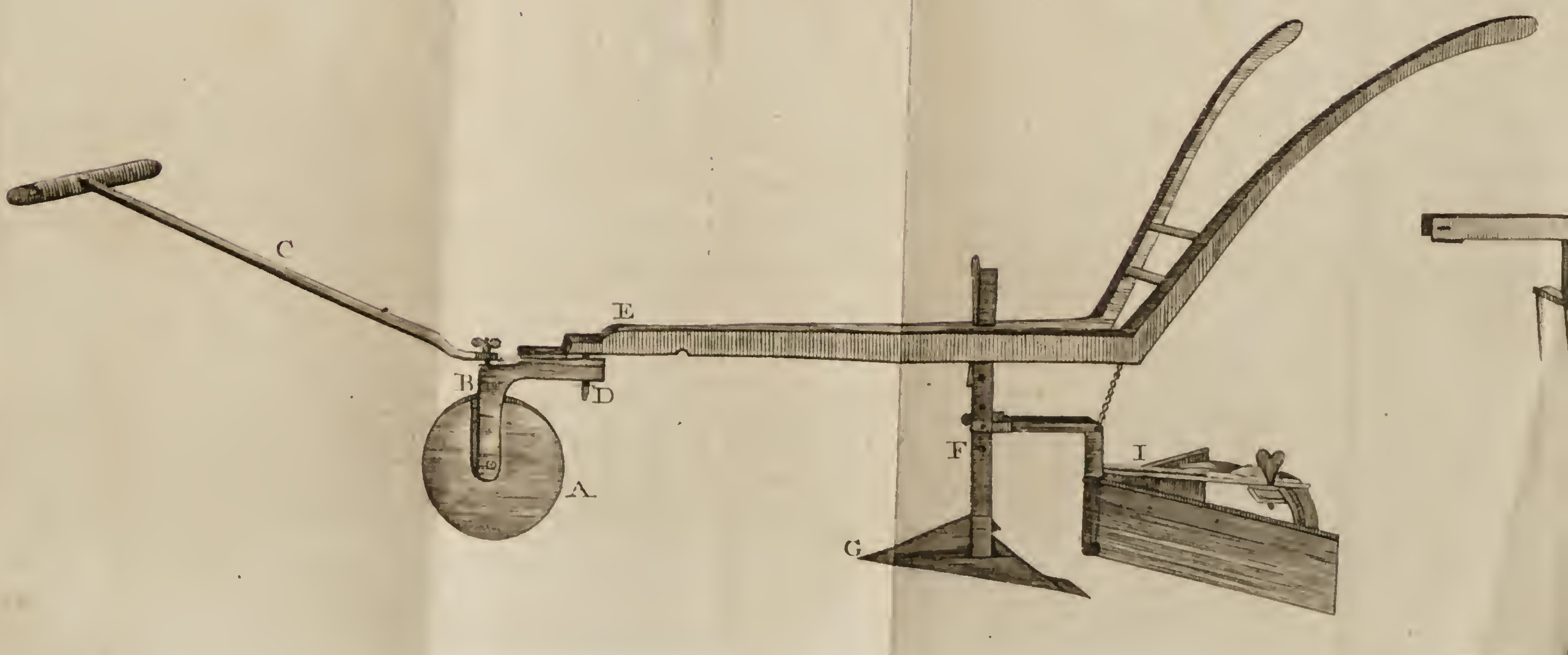
[1784]

Digitized by the Internet Archive
in 2018 with funding from
Wellcome Library

https://archive.org/details/b30369423

By the King's Patent.





85551

DRILL
HUSBANDRY
PERFECTED.

With other intereſting Circumſtances in Agriculture, reſpecting the moſt effectual Methods of producing the greateſt Crops of Corn, which any given Lands are capable of producing; with an elegant copper-plate of a new invented Patent Machine, for drilling Land, and ſowing or planting therein, in any given Quantity, and at any given Depth, and Diſtance, all Sorts of Grain, Pulſe, and Seeds, with or without ground or pulverized Manure, viz. Soot, Salt, Aſhes, &c. mixed therewith, and harrowing the ſame; with a new invented Hand-Hoe.

By the Rev. JAMES COOKE, M. A: S. A.

Mancheſter: Printed by J. IMISON, Smithy Door: And, Sold by Mr. Murray, No. 32, Fleet-ſtreet London, and by moſt of the principal Bookſellers in Great Britain.

ADVERTISEMENT.

THE Rev. James Cooke, M.A. S. A. of Heaton-Norris near Mancheſter, ſole Inventor, Proprietor, and Patentee, not being able to execute all the Orders He has received for Machines and Hoes, is now treating with ſeveral Perſons, in different Parts of the Kingdom for making them; the Price of the Machine and Hoe together, made with Wheels and Roller, to put on, or take off occaſionally, as the Circumſtances of different Lands and Seaſons may require, with other Improvements, is ſixteen Guineas. But if made without Hoe, without Wheels, or without Roller, proportionably cheaper. And to ſave Carriage, all Orders received by the ſaid Patentee, will be forwarded to ſuch Factory, as ſhall be neareſt the Perſon ſending ſuch Order, unleſs deſired to the contrary.

Any one doubting the Utility, or complaining of the Price of the Machine and Hoe, may be accommodated with one Gra-

TIS, by applying to the ſaid Patentee; provided the Perſon accepting the Machine, will condition to pay him, the Value of ſo much Seed and Labour as ſhall be ſaved, and the Value of ſo much better Crop, as ſhall be produced, by means of the Machine, more than could poſſibly be produced by hand ſowing, from twenty Statute Acres of Land, to be procured by the Perſon accepting the Machine, and properly prepared by him for Wheat; or thirty Statute Acres of Land, properly prepared for Barley; to be eſtimated from the average Produce of the Country where ſown, or from ſeveral Lands, or Ridges, of the twenty Acres of Wheat, or thirty Acres of Barley aforeſaid, to be ſown by Hand, and reaped ſeparately.

The above Machine and Hoe, if made upon a ſmaller Scale, and lighter Conſtruction, will be as ſuitable for Gardiners, as Farmers.

To prevent Infringements upon this Patent, the Names of all the real Purchaſers, their Places of Abode, and Number of each reſpective Machine ſo purchaſed, will be publiſhed; and a handſome Reward will be given to any Perſon (and his Name kept a Secret) who ſhall give Information to the ſaid Patentee, of any one making, or uſing any of the ſaid Machines, whoſe Name, Place of Abode, and Number of ſuch reſpective Machine, ſhall not be found in the Catalogue of real Purchaſers.

COOKE's DRILL HUSBANDRY

PERFECTED.

THIS MACHINE, though apparently complex in its Conſtruction, has been experimentally proved to be perfectly ſimple in its Uſe; is adapted to all Sorts of Land in Tillage, from the lighteſt Sand to the ſtrongeſt Clay; is durable and permanent, and ſcarce liable to be out of Repair.

Lands already brought into a proper State of Tillage, and intended to be ſown or planted by this Machine, require no Preparation but common Ploughing; only if ſuch Lands were previouſly rolled, the Surface would thereby be rendered comparatively ſmooth and level, and the Driver of the Machine would be better able to diſtinguiſh the laſt ſown Drills, ſo as to join the ſucceeding ones more regularly and uniformly; eſpecially if a trifling Attention was paid to the Circumſtance, and the Driver would be careful enough to walk upon the laſt ſown outſide Drill, having hold of the Horſe's Head with his Hand, and his Arm continued at ſuch uniform Extent, as might be required for ſowing or planting at different Diſtances reſpectively.

Upon ſtrong Clay Lands, a ſpiked Roller would be found both uſeful and neceſſary to reduce the Size of ſuch large dry Clods, as might be impregnable by common Harrows. This ſpiked Roller, if properly weighted, would penetrate the hardeſt Clods that could poſſibly be met with, and ſo much reduce their Size, as to render thoſe Lands very practicable to be ſown or planted by the Machine, which would otherwiſe have been impracticable to have ſown, with any reaſonable Proſpect of a Crop, even by Hand; of which any one may be particularly informed by applying to Mr. JAMES SEDDON, of New Barn, near Mancheſter, who planted by the Machine near twelve Statute Acres of ſtiff Clay Land with Beans in one Day and a half, only by going over the ſame with a ſpiked Roller. When Land is ſo dry as not to adhere to, or clog a common Roller, its Effects in working and pulverizing the Soil, will be double the Effects of ſo many Harrows as would require an equal Draught, in the ſame Time. Notwithſtanding which extraordinary Effects reſulting from the Uſe of the Roller, it ought by no means to be uſed, when Land is in that clammy, kneading State, that the Particles, being compreſſed by the Hand, will not inſtantly, on being ſet at Liberty, ſeparate again, by their own ſpontaneous Gravity, or the ſlighteſt Touch.

As the Conſequences of rolling Land are good and great, when it is dry they are equally pernicious when it is wet and clammy. In the former Caſe, the large dry Lumps of Earth are cruſhed by the Weight and Action of the Roller, at the ſame Time the Particles of the Soil are ſeparated, and the Pores opened, ſo as to admit the tender Roots of Plants in Queſt of Food more freely, as well as the Air, and with it atmoſpherical Principles of Vegetation; but in the latter Caſe, the Lumps of Earth are not cruſhed or crumbled, but compreſſed and kneaded together by the Weight and Action of the Roller, the Pores of the Soil are cloſed, ſo as to become impervious by the tender Roots of Plants; the Air is alſo excluded, and with it conſequently all the atmoſpherical Principles of Vegetation.

The Edges of Lands or Ridges ſhould not be harrowed down into the Furrows, or thoſe vacant Spaces between the Ridges, but ſhould be left as high, and ſquare, as the Nature of the Land will admit of; by which means the outſide Coulter will make an Inciſion or Drill cloſe to the Edge of the Land or Ridge, ſo that there will be no Land unſtocked with Plants, and the Crops of the two Rows or Drills on each Side of and adjoining the Furrow, will nearly meet each other, conſequently there will be no waſte Land. And the Furrows remaining thus quite open to admit a free Current of Air through the Crop, or to convey ſuperfluous Water from the Land, muſt contribute greatly to the Well-being and good Proof of ſuch Crop. But if the Furrows ſhould, through Inattention or Neceſſity be nearly filled, or even half filled with Soil by harrowing, let a Plough, drawn by one Horſe, be taken up and down each Furrow, and return the Soil again to the Edge of the Land or Ridge, prior to the ſowing or planting that Land with the Machine, and the above Purpoſes will be equally anſwered.

If it ſhould be required to ſow or plant with the Machine after once Ploughing, a Piece of Oat or Barley Stubble, that had been reaped by the Sickle, it would not be amiſs to mow and rake off the Stubble, particularly if ſtrong and ſtout, but trench Ploughing would anſwer beſt for ſuch Land, and would expedite the Buſineſs more than adequate to the Expence; if the Seaſon ſhould be fine, and the Land dry, the mowing of the Stubble might be diſpenſed with, but if wet, or if the Soil ſhould be clammy, which frequently happens at the Time of Wheat Seeding; the Stubble, if not cleared off, would be apt to accumulate before the Coulters, which, notwithſtanding, might be put off by a light Paddle, which the Perſon that attends the Machine might carry in his Hand for that Purpoſe.

The Land thus prepared, and the Machine adjuſted, for Work, which is eaſily and expeditiouſly done, as no ſeparate Part of it will coincide with any other, but that to which it reſpectively belongs; and the Grain or Seed being put into the higher Seed-boxes or Hoppers, an equal Quantity into each Box, from whence the lower Boxes are regularly ſupplied by raiſing or depreſſing the Iron Sliders upon the Partitions of the two Seed-boxes, or by moving the Lever G occaſionally; and the Perſon that attends the Machine, having previouſly, with a Piece of Chalk, made a Stroke or Line acroſs the Backs of all the Coulters, at ſuch Diſtance from the Ends, as he could wiſh to depoſit his Grain or Seed in the Land, muſt let down the Lever C on the left Hand Side of the Machine, when the Coulters B are about three Feet from the End of the Land or Ridge intended to be ſown or planted, that the Cups or Ladles H may have Time to fill with Grain or Seeds; and the Machine being ſet to work, he will inſtantly perceive that the Coulters will enter the Land more or leſs in Proportion to its Denſity.

If the Coulters ſhall ſink ſo deep into the Land, that the Chalk Lines are out of Sight, below the Level of the Surface, he muſt draw out the ſliding Lever A forwards, and by ſuſpending or tying a proper Weight to the End of it, (compriſing a Lever of the firſt Kind, the Fulcrum being between the Power and the Reſiſtance) he will ſoon find the Chalk Lines will become viſible, being raiſed to the Level of the Surface of the Land. But if the Chalk Lines ſhould be above the Level of the Surface of the Land, before the Lever A is drawn out forwards, in that Caſe the Lever A muſt be reverſed, and a proper Weight ſuſpended or tied to the End of it, (compriſing a Lever of the ſecond Kind, the Reſiſtance being between the Fulcrum and the Power) which will force the Coulters into the Land, till the Chalk Lines become level with the Surface. And ſo long as the Machine ſhall continue in this Poſture, and the Land of one uniform Texture, the Depth of the Inciſions or Drills, and conſequently the Depth that Grain or Seeds will be depoſited in the Land, will be uniformly the ſame. But if the Land of the ſame Plane or Incloſure ſhould be of different

Qualities as to its Denſity, a trifling Attention in the Perſon that attends the Machine may be neceſſary, in bearing up or forcing down the ſame, ſo as to keep the Chalk Lines uniformly level with the Surface.

The Lever C ſhould not be lifted up too ſoon at the End of the Land or Ridge, if it is, the Grain or Seed in that Part of the Drills between the Coulters and Harrows will not be covered. And while the Machine is turning round at the End of a Land or Ridge, the Perſon that attends it, ſhould bear it up, that the Coulters may not touch the Ground, by which means it will turn round in leſs Compaſs, and with more Eaſe to the Horſes. If the Lands or Ridges ſhould be irregular as to Breadth, one or more Funnels may be ſtopped occaſionally with a Piece of looſe Paper or Cork, and the Grain or Seed collected thereby, returned into the upper Seed-box. The Seed-box is raiſed or depreſſed by two Screws under the ſame, and there ſhould always be for different Sorts of Grain or Seeds, a ſpace between the Bottom of the Seed-box and the Points of the Ladles equal to the Diameter of the Grain or Seed intended to be ſown or planted.

By reverſing the Ladle Cylinder, the large Cups or Ladles will become retrograde, and the Machine will require no other Alteration for ſowing or planting all Sorts of ſmall Seeds, viz. Turnip, Rape, Cole, Clover, St. Foin, Lucern, &c. &c. &c. and by ſtopping a greater or leſſer Number of Ladles with a little well tempered Clay, the Quantities of Grain or Seed required to be depoſited in one Drill, may be eaſily aſcertained; and but little Trouble is required to unſtop them. In going down Hill with the Machine, the lower Seed-boxes ſhould be more plentifully ſupplied with Grain or Seed, and in going up Hill more ſparingly, than on level Ground. Grain that is limed ſhould be made dry, and the looſe Particles of Lime all ſifted out, before it is uſed, otherwiſe the Grain being ſwelled with Brine, may be inclinable to wedge faſt in the Ladles; and the looſe Lime accumulating at the Bottom of the Boxes will be brought up by the Ladles inſtead of Grain. But the Expence and Labour of Brining and Liming might all be ſaved, only by ſowing good old Seed. A Variety of Experiments all producing ſimilar Effects, will, I hope, juſtify the Aſſertion; although I am not able to aſſign a more probable Cauſe (the real one being not yet diſcovered) than that ſuch infected, ſuch imperfectly vegetated Grain, as might have ſprouted, and produced a much more infected Crop, if the ſame had been ſown as ſoon as reaped, being not ſown till the Expiration of twelve Months, and will not vegetate at all, but turn to Putrefaction, as ſoon as put into the Ground; and if out of the Quantity of Grain ſown, the ſound ones only ſprout and vegetate, I ſhould wonder much if ſuch Crop ſhould prove ſmitten, or if it was, ſhould attribute the Cauſe to ſomething out of the Power of Brine and Lime to prevent. I never heard of any other Uſe, that

Brine and Lime was intended to anſwer, but that of deſtroying the vegetating Power of the infected Grains of Wheat. But if the infected Grains are all killed by the ſharpneſs of the Brine and Lime, I don't ſee which way the ſound ones, being mixed with thoſe that are infected, and going through the ſame Proceſs, can eſcape being injured, which probably may not appear from the firſt ſowing, but in Proceſs of Time, will, moſt likely, produce thoſe very Effects, which Brining and Liming are intended to prevent.

To ſow or plant at the Diſtance of ſix Inches between each Row or Drill, all the Coulters muſt be put in their reſpective Places, and a ſmall Funnel behind each Coulter, and at twelve Inches every other Coulter muſt be out, reckoning from the right Hand Side, and a large Funnel to each Coulter. In ſowing or planting at twelve Inches Diſtance between the Drills, if a ſufficient Quantity of Grain or Seed (the Species is immaterial) ſhall be taken out of one Box, for one Drill, the next adjoining Box being empty, may be filled with Ground or pulverized Manure, ſuch as Rape Duſt, Bone Duſt, Malt Duſt, Soot, Salt, Aſhes, Lime, &c. which being dropt into the ſame Funnel with the Grain or Seed, will be conveyed therewith, and at the ſame Time, into one and the ſame Drill. The Manure, tho' ſmall in Quantity but good in Quality, lying thus cloſe to the Grain or Seed in the Drill, muſt contribute more than a little to nouriſh the young Crop (of Wheat in particular), during the Winter, and will give the ſame an early ſtart in the Spring. The Grain ſhould be put in that Box ſubtending the ſhallow Part, and the Manure in that Box ſubtending the deepeſt Part of the Funnel.

This Method of ſowing Grain and Manure together in the ſame Drill, muſt anſwer well for all Sorts of Grain, as well as ſmall Seeds, particularly Turnip Seed, only by putting on a few large Cups or Ladles occaſionally, to take up the Manure, and may prove of ſingular Service in preventing the horrid Effects of the Fly ; as a Variety of ſharp acrimonious ſulphurous Subſtances might be ground ſmall, or diſſolved in Water and incorporated with Sand, or Earth, ſo as to be depoſited in the ſame Drill with the Turnip Seed ; the diſagreeable ſtimulating Effluvia of which might poſſibly prevent the Propagation of the Species, or keep them off from the tender Plants, at leaſt for a few Days, till the rough Leaf was formed, when it would not be even in the Power of ſo pernicious a Tribe to hurt them.

The Hoe is ſo conſtructed, that one Man will puſh it before him in light-Lands, and hoe in a compleat Manner two Acres per Day , or it may be drawn by one Man, and directed by another ; or it may be conſtructed upon a larger Scale, for various Uſes, to be drawn by a Horſe.

One of its principal Virtues conſiſts, in the Wheel A being applied to the Crank B, ſo that if a Clod or Stone ſhall happen to be in the Way, the Wheel A will go round the Clod or Stone, without forcing the Hoe out of its Direction, ſo as to cut up the Rows of Corn. When it is drawn by a Man or Horſe, the Wheel and Crank muſt be reverſed, and a Pole C to draw by applied to the Angle of the Crank (ſee the Plate) in which Caſe, if the Draught ſhould not be made in a lineal Direction, and parallel to to the Middle of the Space to be hoed, the Perſon that directs the Hoe, notwithſtanding any Irregularity in the Draught, may influence it, by means of a Pin D, that goes through the Crank, ſo as not to come ſo near the Rows of Corn as to injure them in the leaſt. There is no particular Attention required in the Perſon that muſt work this Hoe, only that he keep the End of the Beam E in a lineal Direction with, and parallel to the Middle of the Space that he is hoeing; having previouſly fixed the Shank of the Hoe F by Wedges more or leſs oblique to the Surface of the Land, ſo as to give the Point of the Hoe-plate G which ſhould always be kept ſharp more or leſs Earth.

This Hoe is calculated to cut up all the Weeds growing between the Rows of Corn in their Infancy, whereby all the dreadful Conſequences of the Seeds of Weeds arriving at Maturity and dropping upon the Land, before and at the Time of Reaping, are in great Meaſure prevented.

For the Roots of ſuch Weeds as ſhall be cut up, being expoſed to the Air and Sun for ſome Days, will become incapable of vegetating; conſequently the Propagation of ſuch Weeds, whether by Roots or Seeds, will be rendered perfectly abortive. If there ſhould be too much Adheſion in the Particles of Soil, to quit the Roots of Weeds, by the Action of the Hoe in cutting them up, the Rake H may be applied to the Shank of the Hoe F, ſupplying the Place of the Wings I, which will be found very inſtrumental in ſeparating the Weeds from the Soil, leaving them expoſed upon the Surface of the Land; and in ſtrong Lands a ſmall Weight may be applied to the Angle of the Rake H, which will have agood Effect. But the beſt Preparation previous to hoeing any Crop, would be firſt to roll it.

The firſt hoeing ſhould take Place as ſoon as Weeds begin to vegetate, though the young Crop of Corn ſhall only have made its appearance above the Surface, ſo as to diſtinguiſh the Rows; without either the Rake or the Wings fixed to the Shank of the Hoe, which hoeing ſhould be repeated juſt ſo often as Weeds appear, applying the Rake or Wings occaſionally. By means of the Rake, the Weeds after being cut up by the Hoe, will be better ſeparated from the Soil; and the Wings will earth up the Soil to the Rows of Corn, ſo as to invigorate the Crop ſurpriſingly. But in what Proportion, I am not able to ſay, till I have had Recourſe to future

Obſervations, and impartial Experiments. But that the Advantages ariſing from the Uſe of the Hoe are many and great, may be ſafely taken for granted. For the Weeds are not only cut up and deſtroyed by the Hoe, at the trifling Expence of one Shilling per Acre, but that Quantity of Nutriment which would have been required for the Support of the Weeds, if they had been ſuffered to grow, now takes a different Bias, and adds juſt ſo much Value to the Crop, as the Weeds would have taken from it. And the Soil is not only earthed up to the Rows of Corn by the Wings I, but at the ſame Time and by the ſame Proceſs, a freſh ſurface of Earth is expoſed to the Air, and the Pores of the Soil are opened, ſo as to attract and imbibe Principles of Vegetation from the Atmoſphere, which would have been totally excluded, had not ſuch hoeing taken Place.

Here it may not be unſeaſonable, briefly to take Notice of that inexhauſtible Fund of vegetable Matter or Food of Plants, which the Air or Atmoſphere generally abounds with; for there is not a Particle of nitrous, or putrid, of alkaline or oleaginous Subſtances, not a ſingle Particle of Perſpiration or Putrefaction of Animals or Vegetables, that is ſpecifically lighter than Air, that does not ſpontaneouſly aſcend to ſuch certain Altitude or region of Air, as ſhall be of equal ſpecific Gravity with itſelf; in which Region the aſcended Effluvia will float, till the firſt Condenſation of the Air happens, when the floating Effluvia becoming ſpecifically heavier than Air, will ſpontaneouſly deſcend again upon the Earth, refreſhing the growing Crops, or infuſing their goodly Virtues into the Pores of the Soil of ſuch induſtrious Farmers, as ſhall then by ſeaſonable ploughing and hoeing have brought their Land into a proper State of Tillage. But let me tell the inactive, ſleepy, old-faſhioned-Farmer, who would not for a World be prevailed upon to adopt any new Syſtem, eſpecially if that Syſtem appeared a little myſterious,

rious, and was likely to thwart the old jig-jog, trit-trot Method of his Fore-fathers, ſuffering his Lands in Tillage to remain a long while undiſturbed, either by Plough or Hoe, or other Inſtruments in Huſbandry; Let ſuch be informed, that if he expects to derive any Advantages from this inexhauſtible Fund of Atmoſpherical Principles of Vegetation, he will moſt aſſuredly be totally diſappointed. For notwithſtanding theſe enriching Principles of Vegetation fall upon the Lands of the Sluggard, as well as upon the Lands of his induſtrious Neighbour, the Lands of the latter only are improved, by attracting and imbibing thoſe Principles of atmoſpherical Vegetation, and detaining them in the Pores and Interſtices of the Soil, till called upon by Nature, to anſwer the myſterious Purpoſes of Vegetation; but the Sluggard's Land, having lain a long while undiſturbed, and the Pores of the Soil being all cloſed, by the ſpontaneous Gravity of the Particles, or by falling Hail, Rain, &c. abſolutely denies Admittance to theſe enriching

Atmoſpherical Principles of Vegetation, and they are again exhaled from that Surface of the Earth upon which they lately fell, by the firſt Sun-Gleam or Blaſt of pure Air. If there is one Farmer in Britain, who finds himſelf diſpoſed to diſbelieve and condemn every Thing he cannot comprehend, looking upon the Idea of the Principles of Vegetation, or Nutriment of Plants exiſting in the Air or Atmoſphere, as idle and fictitious, let him behold the aſcending Smoke of his own Fire, or the evaporating Effluvia of his own Dunghill, and conſider what becomes of that Smoke or Effluvia, &c. If he vainly thinks that they aſcend from the Earth never to return, or that they are loſt or annihilated in the Air, he is moſt egregiouſly miſtaken.

For as I have already obſerved, they only aſcend to that Region of Air, which is of equal Specific Gravity with themſelves, deſcending again to refreſh that Earth from whence they aſcended, as ſoon as the leaſt

Alteration in the Air, from a denſer to a rarer Medium, takes Place. That the Smoke of Chimneys, the Effluvia of Dunghills, &c. do actually aſcend, is ſelf-evident, but beyond the Attraction of the Earth they cannot go, therefore they muſt either return again to the Earth, or accumulate ſome where between the Earth and the Sun; but if they had continued to accumulate from the Commencement of their Aſcent between the Earth and the Sun, forming a denſe opaque Subſtance round the Earth, the Inhabitants of this Earth would long ſince have lived in total Darkneſs, as the Sun's Rays would not have been able to penetrate ſo thick a Subſtance. Conſequently the Effluvia of all putrid and nitrous Subſtances, the Perſpiration of Animals, the Effluvia ariſing from the Putrefaction of both Animals and Vegetables, the Evaporations of large manufacturing Towns, &c. In ſhort, the Effluvia of all Subſtances whatever, ſpecifically lighter than Air, do certainly aſcend and deſcend alternately, as Heat and Cold, which reſpectively conſtitute the ſpecific Gravity of the Air, alternately ſucceed each other. Hence appears the Neceſſity of the Farmer's Ploughing his Fallows, and hoeing his Crop-Lands frequently, which he could ſcarce fail to do, if he was but convinced, how much his Intereſt depends thereupon.

Three or four Works of the Plough upon Lands that ſcarce get one decent Ploughing, would repay the Farmer well for his Labour. And a Multitude of extraordinary Advantages would accrue from ſuch a Practice. Particularly if Land was well Ploughed immediately after the Crop was reaped and cleared off, the Labour would not be loſt: For the Moment ſuch Ploughing was performed, that Land would begin to attract princidles of Vegetation from the Air; and ſuch Seeds as might have vegetated during the Interval between the laſt Time of hoeing, and reaping the Crop, together with the Stubble, would all be turned under Furrow, there to rot and putrify together; and a

Quantity of freſh Earth being brought up to the Surface, would be mollified by Froſt and Snow, and impregnated with atmoſpherical Principles of Vegetation. By this Proceſs, Land would be in Condition for an early ſowing in the Spring, and require but little Preparation for ſuch Crop, as the Farmer might chooſe. And if he means to encourage Nature to ſmile upon his Labours, and render them proſperous, he muſt not omit one Opportunity of hoeing ſuch Crop, nor one Opportunity of Ploughing the ſame Land, from the Time that the Crop is got off, to the Time it is ſown again. For upon the Number of the Ploughings, and Seaſonableneſs of the ſame, entirely depends the Quantity of vegetable Nutriment that will fall to the Share of ſuch Lands, from the Air or Atmoſphere.

But here the Farmer muſt not entirely rely upon having properly prepared his Land for a Crop, if he fruſtrate the good Effects of ſuch Preparation, by caſting his Grain or Seed upon his Land almoſt promiſcuouſly, and in Quantities ſhamefully too great. Would not any one call that Grazier a Madman, who ſhould ſtock his Paſture with twice the Number of Cattle that ſuch Paſture was able to ſupport? What Appellation then belongs that Farmer, who ſhall caſt upon his Land the uſual Quantity of Grain or Seed, when one Third of that Quantity, would produce one Fourth more Crop. And yet, this is the habitual Practice of Farmers in general.

A Number of Experiments, I could produce of one Fourth Part better Crops reaped laſt Seaſon, from one Third of the Grain or Seed uſually expended. Mr. Johnſon, of Top of Bank, near Mancheſter, reaped a Quantity of Wheat, that produced upwards of forty-ſeven Meaſures from a ſtatute Acre, from three Pecks of Seed ſown by the Machine; when an equal Quantity of adjoining Crop ſown by Hand, upon Land under the ſame Tillage, did not produce quite 30. And that a regular Diſtribution of Grain or Seed in the

Land in proper Quantities, and at proper Depths and Diſtances, are Circumſtances eſſentially neceſſary for producing the greateſt Crops of Corn, that different Lands are capable of producing, may appear ſufficiently clear to the meaneſt Capacity, from the following Conſiderations:

Imagine a given Quantity or Space of Land (ſuppoſe a Foot ſquare), to be impregnated with a given Quantity of vegetable Matter, or Pabulum of Plants, and one ſingle Grain of Corn planted in the Center thereof; if the Pabulum or Nutriment ſecreted in the given Quantity of Land, ſhall prove more than ſufficient to bring the above ſingle Stem to Maturity, Nature will ſupply the Deficiency, by cauſing to vegetate from the ſingle Stem, juſt ſo many additional Stems or Offſets, as the given Pabulum or Nutriment in the given Quantity of Land, ſhall be able to ſupport and bring to Maturity. Whereas, if a greater Number of Grains ſhall chance to fall upon the given Quantity of Land, than the given Quantity of Pabulum is able to ſupport and bring to Maturity (which frequently happens, and not to be remedied in the common Method of Hand-ſowing), the given Pabulum or Nutriment in this Caſe, having a ſuperfluous Number of Stems to ſupport, will be all exhauſted before the Crop is brought to Maturity, and the Conſequence of ſuch a Failure in Vegetation, muſt bring on a premature Ripeneſs in the Crop, abounding with light imperfectly vegetated Grain.

The following Experiments, which gave Birth to this Machine and Hoe, may poſſibly explain this Matter more fully.

In the Year 1783, I made a fair and impartial Experiment, between two Buts or Ridges of Wheat, planted with a dibling Stick, and two adjoining Buts or Ridges ſown by Hand; the Produce of the dibbled

Crop, was exactly one Fourth Part more, than the Produce of the ſown Crop; and the Seed ſaved by dibling, nearly paid the additional Expence. Notwithſtanding which Preference in favour of the dibbled Crop, ſeveral unſurmountable Difficulties evidently lay in the Way, of the Practice becoming general. For, (excluſive of the dibbled Crop not admitting of palpable Hand-hoeing, and the Surface of the Land being too much trampled upon, and compreſſed after the Seed was depoſited, by the Feet of thoſe Perſons that dropped the Seed, ſo as to cloſe the Pores of the Soil); it ſoon occurred to me, that a ſufficient Number of Hands would be impoſſible to be procured to do the Buſineſs in the Time required. For at the Time of Wheat Seeding, the Weather is often precarious, and if a wet Seaſon immediately ſucceds the dibling, one Half of the Grain ſo dibbled, would be deprived of its vegetating Power, by lying in ſtagnated Water. For the Soil, ſurrounding the Hole made by the Dibble, being compreſſed, and the Inſide being poliſhed by the Action of the Dibble, ſo as to hold Water in a wet Seaſon, longer than the Reſt of the Land, and the Grain or Seed lying in the Water, muſt enevitably periſh; by which Means there would be a Number of vacant Spaces to be filled up; which would not only create an additional Labour and Expence, but the Surface of the Land would thereby be more and more trampled upon and compreſſed. Notwithſtanding, I clearly ſaw the above Diſadvantages would always inſeparably attend the Proceſs of Dibbling, one fourth Part more Crop, prompted the two following Experiments the ſucceeding Year.

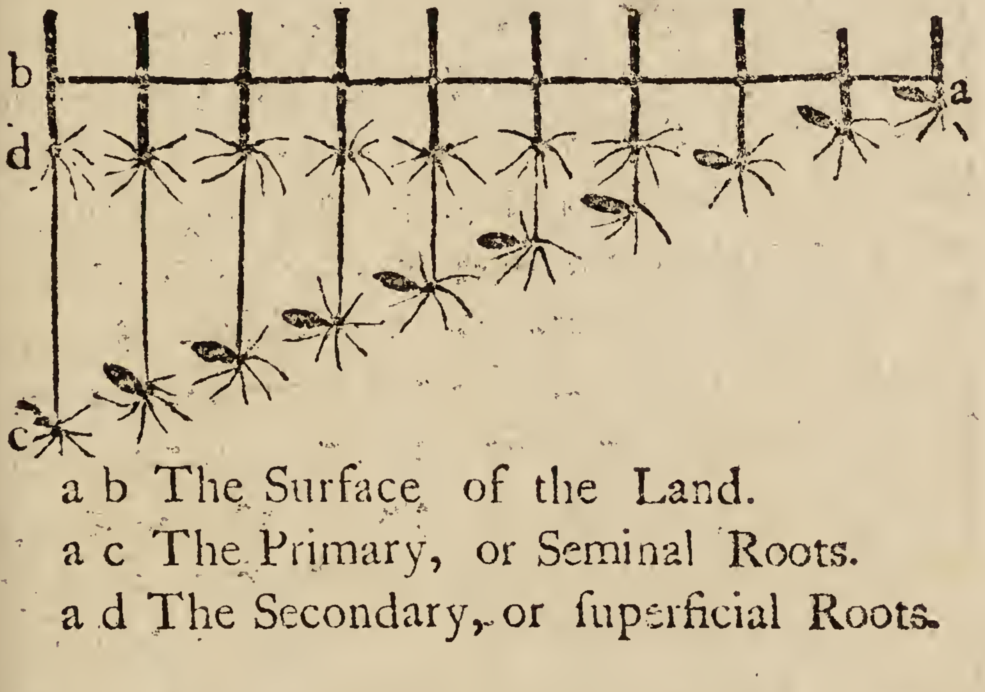
At the uſual Time of ſowing Wheat, I placed three Boards, about fifteen Feet long, and one Foot broad, edgeways in the Ground, at the Diſtance of one Foot from each other, by which Means I had two Slips, or Beds of Earth ſecluded from the reſt of the Land, each fifteen Feet long, and one Foot broad; one of which Beds of Earth I manured well with rich fermented Dung from an old Hot-bed, the other Bed of Earth was not manured at all. In the manured Soil, I made fifteen Holes with a dibling Stick, at the Diſtance of one Foot from each other: In the firſt Hole, I put one ſingle Grain of Wheat, in the the ſecond Hole two Grains, in the third Hole three Grains, and ſo on, increaſing one Grain every Hole, till I came to the fifteenth Hole, in which I depoſited fifteen Grains. The Conſequence was, the reſpective Holes 1, 2, 3, 4, 5, 6, 7, 8, when the Crops came to Maturity, produced, ſome 7, ſome 8 Stems, with a perfect Ear to each Stem, and ſcarce one light imperfect Grain to be found in the Whole, nor any material Difference in the Weight of the Grain produced from each ſeparate Hole. But the reſpective Holes 9, 10, 11, 12, 13, 14, 15, produced juſt ſo many Stems, as I depoſited Grains of Corn in the ſame, but many of the Ears very lean, and the Grain light and ſmall, and the Weight of the Produce of Grain in each ſeparate Hole, gradually decreaſing from 8 to 15.

In the other adjoining Slip of Land, that was not manured, I alſo made 15 Holes, at the Diſtance of one Foot from each other, and depoſited therein Grain as above; the Conſequence was, the Holes 1, 2, 3, produced each 3 Stems reſpectively, with full perfect Ears, and the Grain of each ſeparate Hole of equal Weight. But the Holes from 3 to 15, had juſt ſo many Stems, as I put in Grains, and the Produce in this Caſe as in the former, gradually decreaſing from 3 to 15, and ſeveral of the Ears of ſome of the Holes, particularly 13, 14, 15, only Shadows and Appearances of Ears, nothing but Straw and Chaff, and ſome of the Ears ſmitten.

From whence it is clear, there is but one given Diſtance, at which Grain or Seed ſhould be depoſited in the Land, in Order to produce the greateſt Crop of Corn, which that ſame Land is capable of producing. And this

Diſtance ought uniformly to be equal to twice the Length, that the Roots of any Crop of Corn will extend, in any given Land, in Queſt of Food. For ſuppoſe two Rows of Corn, ſown at the Diſtance of twelve Inches from each other, if there is a Property in the Species of that particular Corn to make Roots ſix Inches long, it is evident that the Points of the Roots of both Rows, will meet each other in the Middle of the Space between the Rows; Conſequently the Roots of the two Rows, by meeting together, and pervading the whole Stratum of the Soil, muſt attract and abſorb all the vegetable Nutriment, or Pabulum of Plants contained in that Soil; and more than ALL, no conſciencious Man will ever hope to reap. I have mentioned the Diſtance of twelve Inches, in Preference of all the Diſtances I have tried, having reaped a much better Crop of Wheat ſown at that Diſtance, than any other, much better than ſix Inches in particular, both ſown by the Machine the ſame Day, and upon Land in the ſame Tillage, notwithſtanding the twelve Inch Crop had only half the Quantity of Seed, that was expended upon the ſix Inch Crop; and the ſix Inch Crop had only half the Quantity of Seed that is cuſtomary to ſow by Hand, yet was much better Crop. Thus it appears that Nature has pointed out the Diſtance, that all Plants ought to grow from each other; which ſhould be uniformly equal to twice the Length of the Roots of ſuch Plants reſpectively. But Nature has not only pointed out the Diſtance, but the exact Depth likewiſe, that Grain or Seed ſhould be depoſited in the Land. For if a Grain of Wheat be ſown or planted four or five Inches deep, the ſeminal Roots formed at that Depth, for the Support of the young Plant during the Winter, will all die away in the Spring, and Nature will aſſiſt the Plant, in furniſhing itſelf with a new Set of Roots for the Support of the Crop, till it is arrived at Maturity, from a Knot or Joint formed for that Purpoſe upon the Stem of the Plant, from one Inch and a Half to two Inches under the Surface of the Land. From whence it ſhould ſeem, there is but one given Depth, at which different Grain or Seeds ſhould be reſpectively ſown or planted; for excluſive of the above Dictates of Nature, it is ſelf-evident, that ſuch Grains of Winter Corn as ſhall happen to be ſown too deep, will be in Danger of periſhing by ſtagnated Water; and ſuch as ſhall be ſown too ebb, will be in Danger of being thrown out of the Land by Froſt, or ſcorched by Summer's Heat. And of Spring-Corn, ſuch Grains as ſhall be ſown the deepeſt in a dry hot Seaſon, will vegetate the firſt, and thoſe ſown near the Surface, will not ſprout or vegetate at all, till the Land has been cooled and ſoftened by Rain; Conſequently the Crop (particularly if Barley), will be unkind, one Part dead Ripe, the other Part quite green; whereas if all the Grain had been depoſited in the Land, at one regular Depth, it would certainly have vegetated at one and the ſame Time, and the Crop at one and the ſame Time would have been uniformly ripe.

The above Aſſertion reſpecting the Depth that Grain or Seed ſhould be ſown or planted, may probably be better explained by the following Experiment. Having ſelected ten good Grains of Wheat, I depoſited them in the Ground, at the Time of Wheat Seeding, in the following Order:



a b The Surface of the Land.
a c The Primary, or Seminal Roots.
a d The Secondary, or ſuperficial Roots.

The firſt Grain was only juſt covered with Soil, the ſecond was depoſited one Inch deep; the third two Inches deep, and ſo on till I came to the tenth Grain, which was depoſited nine Inches deep. As the Seaſon was favourable, all the ten Grains vegetated, but the deepeſt ſown ones looked more feeble and delicate, than thoſe ſown nearer the Surface; a Circumſtance not at all to be wondered at; as the ſeminal Roots lay too deep to derive much Aſſiſtance from the Influence of the Sun and Air in promoting Vegetation. Whereas the Roots of thoſe Grains that lay nearer the Surface, were conſtantly refreſhed both by Sun and Air. In the Month of January, the firſt ſown Grain, that was only juſt covered with Soil, periſhed; being thrown out of the Ground by Froſt. And in February three of the deepeſt ſown Grains 8, 9, 10 alſo periſhed, the Roots being ſo deep as to be killed by ſtagnated Water, or ſtarved for Want of vegetable Food or Pabulum of Plants. And in the Month of March, (the Time when young Crops of Wheat in general, look pale and ſickly) I loſt another of the deepeſt ſown Plants, the Cauſe of which I could not diſcover, unleſs it was owing to ſharp froſty Winds, and other tempeſtuous Weather, which commenced juſt as the ſeminal Roots had ceaſed to ſupport the young Crop, continuing unfriendly to Vegetation for three or four Weeks; during which Interval, all the five ſurviving Plants appeared almoſt dead, owing to the ſecondary or ſuperficial Roots not being formed. But no ſooner was the Weather changed for the better, than I perceived that the Plant proceeding from the Grain depoſited at two Inches, revived much faſter, and came about more expeditiouſly, than any of the others.

This Circumſtance induced me to examine the Roots of all the reſpective Plants, by removing carefully the Soil from one Side of them, where I did not find one live Root, only the Appearance of Roots juſt budding from the Knot or Joint formed upon the Stem (which I have already deſcribed) excepting that Plant which was produced from the Grain depoſited at the Depth of two Inches, and there I found the ſeminal Roots all alive, and ſending out freſh or ſecondary Roots from almoſt every Pore; and in a few

Days I was further convinced, that this Plant never loſt is primary or ſeminal Roots, as by that Time, it was arrived at ſuch a State of Health and Vigor, with its full Compliment of additional Stems or Offſets, as none of the other Plants attained to in leſs than ten Days after. And this Advantage gained at Start, the Plant evidently maintained till it arrived at Maturity, which was five or ſix Days ſooner than any of the other Plants.

The Crop produced from that Grain which was depoſited at the Depth of one Inch, the Roots (not having ſufficient Depth) went down before the ſame arrived at Maturity, and was Conſequently ſpoiled.

From the above Experiments, I was perfectly ſatisfied that a regular Diſtribution of Grain or Seed in the Land, in proper Quantities, and at proper Depths, and Diſtances, with ſeaſonable Hoeing, are all eſſentially neceſſary for producing the greateſt Crop of Corn, that any given Land is capable of producing. Eſpecially as I found that Nature has a power of creating from one ſingle Grain or Stem, juſt ſo many additional Stems or Offſets as ſhe is able to ſupport and bring to Maturity, but when overſtock'd cannot kill or annihilate one; but is compeled and obliged to ſupport the too heavy Burthen till ſhe is quite exhauſted, and can ſupport it no longer. And this Deficiency in Vegetation happening ſome-Time before the Crop is arrived at Maturity, an unſeaſonable and premature Ripeneſs in the Crop muſt neceſſarily enſue; conſequenly the Grain muſt needs be light, lean, and imperfect; clearly indicating to the Farmer, that though Nature is active in her Productions, which are uniformly equal to her Abilities, yet wiſhes to be accommodated with the means of diſplaying thoſe Abilities, in effecting the Grand Myſteries of Vegetation, in her own way; and that way has been already pointed out.

As I am unfortunately arrived at the full Extent of this Treatiſe, before I have half finiſhed the Subject, muſt reſerve what remains to be ſaid upon the Subject for a future Edition, with a variety of Experiments, and Obſervations, particularly upon the Circumſtance of Drilling Clover-Seed, and Hoeing the Crop, and afterwards planting Wheat upon one Furrow with the Machine. &c. &c. therefore ſhall only ſay, that every Land occupier, by the Uſe of the Machine and Hoe, and by putting in Practice what has been already advanced, enjoys an opportunity of reaping from every Statute Acre of Wheat, not leſs than from 4 to 5 Pounds more, than he could poſſibly have reaped from the ſame Land, if it had been ſown by Hand, and of other Crops in Proportion. I aſk no Credit for this Aſſertion, the Facts have been already Experimentally demonſtrated, in the preſence of many diſintereſted Spectators, and I have not a doubt, but that every future, fair, and impartial Experiment, by whomſoever made, or upon whatſoever Land, will demonſtrate the ſame.

FINIS.